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STUDY ON CHEMICAL PARAMETER OF METEORITE IMPACT CRATER LAKE LONAR, INDIA.

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ABSTRACT

Lonar Crater (19o58'N and 76o31'E) Lake is the third largest natural salt-water lake in the world. Lonar Crater is a wet land which is important biodiversity sector. The lake brine supports typical microbial flora and fauna need to be investigated to access its value of wet-land to be recognized as Ramsar Site of India.

During the study period Seven different chemical Parameter were studied, Total Iron, Soluble Iron, Ferric Iron, Ammonia, Nitrite, Nitrates, Total Organic Nitrogen, Total Phosphate, Sulphates and Silicates. The crater physical setup, its relative Geographical and Ecological isolation evolve Limnological status in a unique way. Its unusual and climatic isolation highlights the ecosystem as an ecological wonder. Present work deals with analysis of chemical parameters that aims to investigate the pollution level to know Eutrophication status of Lonar Crater Lake. The study of hydrological status reveals variation of Phosphate and Nitrates during rainy season and summer while the lake is leading towards Eutrophication.

KEYWORDS : Lonar Lake, chemical parameter.

INTRODUCTION

Lonar crater is believed to be originated due to meteoritic impact and is the third biggest in the world. The Lonar ecosystem has evolved in a unique way due to the unusual geohydrological and climatic conditions. However, the same conditions have made it extremely fragile and vulnerable to

human interventions. Therefore, the biotic zones resulting from such isolation need immediate protection. Malu, (2002), Kodarkar, (2008).

The Lonar crater has attracted the attention of world geologists for investigation of its origin and the source of salinity of lake water; it is ecological wonder (Malu et al., 2007).

The time of excavation of material from the crater may last for several minutes following the impact, while the amount of impact melt produced is dependent on the abundance of water in the target rocks (Melosh, 1989). Target material below the excavation depth is pushed downwards, whereas the strata above this depth may be pushed upwards (dePater and Lissauer, 2001) as seen in the Lonar crater. Lonar Crater Lake consist of various eco-tones inhabited a wide range of plant and animals life.

The cultural eutrophication of this lake is takes place due to: The untreated domestic sewage and garbage coming out from Lonar town that reaches into the lake. Inside the crater, some farmers downing farming and hence the use of inorganic fertilizers, insecticides and pesticides like toxic compounds inters in lake. Simultaneously, Hygienic activities are carried out by the local people in the fresh water springs and used waste water enters in lake at last. (Yannawar et al., 2013)

The lake water was observed to be blue green in color due to dominance of algal bloom in lake water (Pedge and Ahirrao, 2013).

Site Description:

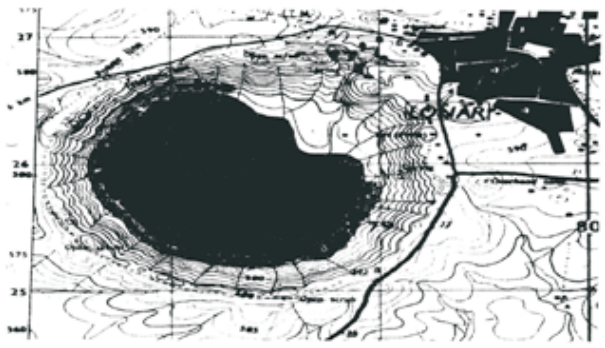


Fig. 1. Topographic Map of Lonar Crater (19^{0}58'N and 76°31'E)

Lonar Crater (19^{0}58'N and 76°31'E) Lake is a unique meteoritic crater in basaltic rock. It lies in a nearly circular depression surrounding on all sides by steeply rising escarpments. The lake basin is closed on all sides and therefore has no outlet. Lonar Lake has a localized temperature system as it is being subterranean hollow closed from all sides; the lake basin is partly screened from direct sun light at different places and at different times of the day (Dabhade, 2006).

MATERIAL AND METHOD:

Four sampling station selected For the Present work these are S1, S2, S3, and S4 East, south, west and north. Monthly Water sample were collected from four different sampling sites in the periods of One Year (Jan 2013 to Dec 2013). Seven different chemical parameter analyzed these are Total Iron, Ammonia, Nitrites, Nitrates, Silicates, Total Phosphates, Sulphates were analyzed by using ELICO NEPHELOMETER CL 52D by using photometric method with the help of APHA (2006) standard method for water analysis.

Table NO. 1 Photometric Chemical parameter analyzed data.

Month	Sites	Iron mg/L	Ammonia mg/L	Nitrites mg/L	Nitrates mg/L	Phosphates mg/L	Sulphates mg/L	Silicates mg/L
Jan-13	S1	3.6	8.2	1.5	17	1.12	137	0.34
	S2	2.72	7.3	5.4	14.2	2.38	107	0.34
	S3	1.84	8.7	1.8	13.6	1.4	83	0.22
	S4	1.28	9	9.4	10.4	0.86	67	0.6
Feb-13	S1	3.36	9.2	10	9.6	0.74	115	0.27
	S2	1.84	14.8	18	7.2	2.1	74	0.32
	S3	4.08	9.8	6	8.4	1.86	86	0.32
	S4	2.48	17.2	18	10.8	1.22	202	0.18
Mar-13	S1	3.6	9.5	14	15.2	1.8	120	0.38
	S2	2.32	14	2.6	7	2.17	112	0.28
	S3	1.92	11	0.9	10.4	2.03	128	0.19
	S4	4.12	7.6	1.2	5.6	3.4	96	0.17
Apr-13	S1	2.88	6	0.9	11	1.27	60	0.12
	S2	2.72	7.8	6.8	8.4	2.07	54	0.12
	S3	2.56	8.4	7	9.2	1.38	38	0.2
	S4	1.84	5.2	8	7.4	0.76	106	0.24
May-13	S1	1.2	8.8	8	8	1.58	78	0.31
	S2	1.68	6.7	6.2	6	1.64	103	0.37
	S3	1.04	8.2	16	17.4	1.2	137	0.23
	S4	1.44	5.6	20	14.4	2.06	190	0.14
Jun-13	S1	1.6	19	10	16	0.82	68	0.46
	S2	1.36	21	6	14.2	0.68	73	0.37
	S3	0.92	17.4	4	17.4	0.72	57	0.31
	S4	3.6	3	3	18	0.56	102	0.18
Jul-13	S1	4.08	21	2	7.6	0.78	57	0.3
	S2	2.72	10.5	8	5	0.52	38	0.41
	S3	3.44	16	3.5	7	0.69	103	0.39
	S4	2.88	18.5	2.7	7.8	0.36	22	0.34
Aug-13	S1	2.24	22	8	7.4	0.67	36	0.13
	S2	1.68	15.4	4	6.6	0.98	53	0.13
	S3	1.52	10.7	7	9.6	0.36	62	0.24
	S4	1.4	4.2	2	12.8	1.2	110	0.58
Sept-13	S1	4.12	18.2	4	5.2	2.13	73	0.09
	S2	3.36	8.2	3	5.6	1.42	84	0.12
	S3	2.4	6.8	3	6.8	1.05	90	0.27
	S4	2.08	15.4	3.6	5.8	0.86	142	0.32
Oct-13	S1	2.92	6.3	6	5.4	0.9	153	0.13
	S2	2.48	19.8	9	6.8	0.47	208	0.24
	S3	1.92	8.3	13	6.4	2.15	147	0.32
	S4	1.36	9	3	6.8	1.82	103	0.18
Nov-13	S1	4.4	11.8	11	6	1.8	130	0.25
	S2	3.84	21.7	7.6	10	0.97	116	0.14
	S3	2.68	5.3	2.3	11.6	0.83	82	0.37
	S4	1.56	3.2	4	5.8	0.72	96	0.43
Dec-13	S1	2.2	20	10	6.4	0.2	190	0.07
	S2	2.04	12.1	8	7.2	0.15	208	0.09
	S3	2.48	30	19	6.8	0.18	180	0.11
	S4	3.44	15.6	14.4	8	0.28	130	0.08

RESULTS AND DISCUSSION:-

Seven different chemical parameter of Lonar water sample was given in Table No. 1. Iron is one of the most important trace elements in biological system. In Ground Water it was found in Ferrous Bicarbonate form due to oxidation and alkalinity of lake water. During the study periods in all four sampling site Highest value of total iron was found to be 4.4 mg/l and lowest was found to be 0.9 mg/l. Higher value of Iron was obtain during the month of summer and lower was in month of winter. Graph Plate No. 1.Total Iron. In ecosystem Nitrogen is found in Inorganic and organic form. Inorganic forms of Nitrogen are Ammonia, Nitrates and Nitrites and organic Form of Nitrogen like Urea, Nucleic acid and amino acid. If organic forms of Nitrogen and phosphorous are found in higher range then they lid to

Eutrophication.

Ammonia is dissolved in a water to produce Ammonium hydroxide and further dissociates in to Ammonium and hydroxyl ions. Aquatic autotrophs incorporate nitrogen through ammonium ions at a faster rate. During the study period Highest value of Ammonia was found 30 mg/l in sampling site S3 on month of December and lowest was found 3 mg/l in S4 on month of Jun. During the month of January to April Highest value was 14.8 mg/l in S2 and lowest was 5.2 mg/l in S4. During May to August highest value was 22 mg/l on S1 and lowest was 3 mg/l on S4. In month of December it was 30 mg/l on sampling site S3 and low was in November which was 3.2 mg/l on sampling site S4. Graph Plate No. 2. Ammonia During the study period's highest value of Nitrites recorded in the month of May which was 20 mg/l on sampling site S4 and lowest value was in the month March was 0.9 mg/l on sampling site S1. Lowest value was observed in the month of July. In the Month of January to April Highest was 18 mg/l and lowest was 0.9 mg/l. During Month of May to August highest value was 20 mg/l on sampling site S4 and lowest value was 2 mg/l on sampling site S4. During the month of September to December highest value was 19 mg/l on S3 and lowest was 2.3 mg/l on S3. Graph Plate No. 3. Nitrites. Shinde, et.,al.(2013) Nitrites are found in traces amount but their value was slightly increases during study periods. During study period Highest value of Nitrates was found in month of Jun which was 18 mg/l on sampling site S4 and Lowest was in the month of July which was 5 mg/l. In Month of January to April highest was 15.2 mg/l on Sampling site S1 and lowest was 5.6 MG/L on Sampling site S4. During the Month of May to August highest was 18 mg/l on sampling site S4 and lowest was 5 mg/l on sampling site S2. In winter Month of November it was 11.6 mg/l on S3 and lowest was 5.2 mg/l on sampling site S1. Graph Plate No. 4. Nitrates. It was gradually increases Dabhade, (2006).

Phosphates is also important element of aquatic ecosystem during the study periods highest value of phosphate was found in month of March 3.4 mg/l on sampling site S4 and lowest was in December 0.15 mg/l on sampling site S2. During the January to April it was found that 3.4 mg/l on sampling site S4 and low value was 0.74 mg/l on sampling site S1. During the month of May to August highest value was 2.06 mg/l on S4 and lowest was 0.36 mg/l on Sampling site S4. During the Month of September to December highest value was 2.15 mg/l on sampling site S3 and lowest value was 0.15 mg/l on sampling site S2. Graph Plate No. 5. Phosphates Natural water contains higher level of Sulphates contributed from weathering of the rocks. Due to surface water runoff, agriculture run off, washer man activities increases inorganic phosphate in water in rainy season therefore phosphate level increases in monsoon season. Similar results obtain by Borul (2012) observed phosphates value in the ranges of 0.42 to 0.82mg/L. The phosphate of Lake Water was found 0.47mg/L in post-monsoon season while 0.42mg/L and 0.43mg/L in the pre-monsoon and monsoon season studied by Pawar (2010). Siddiqi (2008) Reported total phosphates in to the range of 2.8-2.9mg/L indicating good biotic utilization by the variety of aquatic biotic life forms and that it is not a limiting factor to biological growth in Crater Lake and such phosphates indicate eutrophication trends in Crater Lake. Satyanarayan et al., (2008), Verma et al., (2013) the phosphates values was ranges from 4 to 6mg/L. In post monsoon phosphates was 0.904mg/L and monsoon it was 1.690mg/L and average 1.076mg/L observed by Yannawar et al., (2013). Higher concentration of phosphates which acts as the nutrients which is responsible for the increasing the growth of algae and plants and lid to Eutrophication, nitrates and phosphates their impacts are extremely varied and potentially destructive and both are in water body can contributed high BOD by Dabhade (2013) and Rachel leng (2009). Domestic sewage also contributes Sulphates to an aquatic ecosystem and hence high level of Sulphates is an indication of pollution. During the study periods highest value of Sulphates was found 208 mg/l in the month of

October and lowest was 22 mg/l in the month of July. In the month of January to April highest value recorded 202 mg/l at sampling site S4 and lowest was 38 mg/l at sampling site S3. During the month of May to August it was 190 mg/l and 22 mg/l at S4. In month of September to December it was 208 mg/l and 73 mg/l at sampling site S2. Graph Plate No. 6. Sulphates. Sulphates level somewhat increases during study periods Borul, (2012) also found such results.

Silicates are abundance in rocks, natural water contains very high levels of it Normal range found in natural water is 1 to 30 mg/l. During the study periods highest value of the silicates was 0.6 mg/l and lowest was 0.07 mg/l. During the month of January to April highest value of silicates was 0.6 mg/l at S4 and lowest was 0.12 mg/l at S1and S2. In month of August highest value was 0.58 mg/l at sampling site S4 and 0.13 at S2. During the month of September to December Highest was 0.32 mg/l at S3 and lowest was 0.07 at sampling site S1. Graph Plate No. 7. Silicates

CONCLUSION:

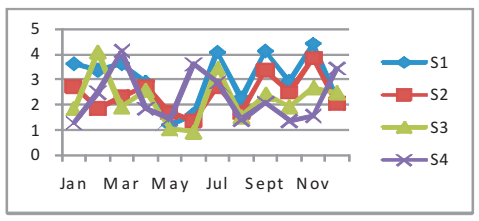
Lonar Crater Lake is a wet land of important biodiversity. It is extremely important for waterfowls, ducks, cranes, and many other migratory birds and microscopic organisms. The hydrological study reveals deteriorating changes leading towards Eutrophication led to reduction of flora fauna and macrophytes and increase in pathogenic organisms. It is necessary to compile the available data together, so that the remedy for the conservation of the Crater will be possible only through comprehensive conservative measures which will be conceived during the project work. The lake brine: supports typical microbial flora and fauna need to be investigated to access its value of wet-land to be recognized as Ramsar Site of India.

RECOMMENDATIONS AND SUGGESTIONS:

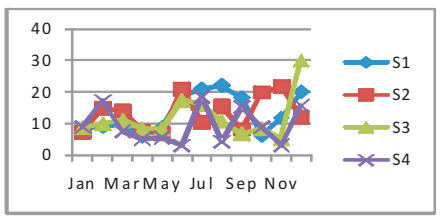
It is intensive need of conservation of Lonar lake because of its uniqueness regarding many aspects i.e. Morphometry, Origin, Salinity, Alkalinity, Biodiversity, Geological setting, Topography, Ecology. All the above stated aspects indicating that the lake is not a ordinary occurance in India. Unfortunatelly such a ecological wonder is threatened by anthropological interventions. Due to that conservation should be taken for such ecological wonder.

Graphical presentation of Chemical parameter

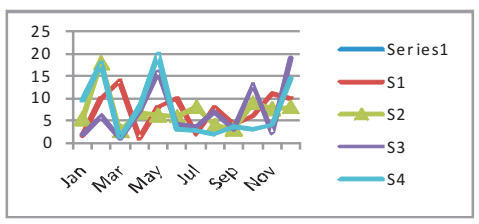
Graph Plate No. 1 Total Iron



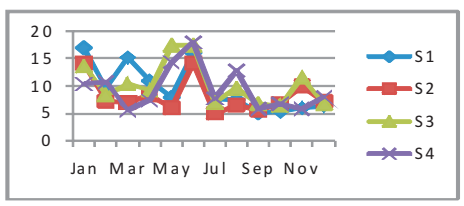
Graph Plate No. 2 Ammonia



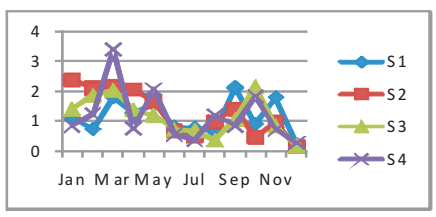
Graph Plate No. 3. Nitrites



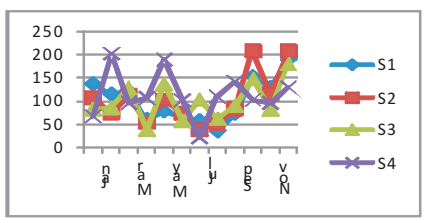
Graph Plate No. 4 Nitrates



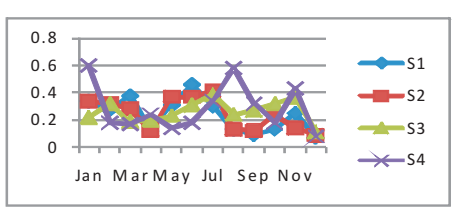
Graph Plate No. 5 Total Phosphates



Graph Plate No. 6 Sulphates



Graph Plate No. 7 Silicates



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